

Sub 917
1 8. An optical film of light transparent material including
2 a first surface having an optically rough structure for diffuse-
3 transmitting incident light and a second surface having a wave
4 structure including a plurality of isosceles triangle prisms
5 arranged side-by-side substantially throughout said second
6 surface, the prisms having smooth surfaces for refracting said
7 light diffuse-transmitted from said first surface and
8 directionally distributing said diffuse-transmitted light through
9 said second surface.

10 9. The optical film according to claim 8, wherein a top
11 angle of said isosceles triangle prisms is in a range of about 90
12 degrees to about 120 degrees.

New Matter
13 10. The optical film according to claim 8, wherein said
14 optical film is positioned within a liquid crystal display, said
15 optical film further including means for increasing illumination
16 within and decreasing illumination outside of a viewing angle of
17 about 35 degrees in the vertical direction and about 55 degrees
18 in the horizontal direction of the liquid crystal display.

1 11. The optical film according to claim 8, wherein a
2 polarizer is positioned between a liquid crystal display panel
3 and said optical film, wherein a direction along which peaks and
4 valleys of said isosceles triangle prisms are oriented is aligned
5 in parallel to a polarizing axis of said polarizer.

1 12. The optical film according to claim 8, wherein the tops
2 of the isosceles triangle prisms are no more than 160 μ m apart.

1 13. A liquid crystal display device including a liquid
2 crystal display panel and a back light device, said back light
3 device comprising:

4 a light source for emitting light;

5 a light guide having a top surface facing a back surface of
6 said display panel and a side surface receiving said light from
7 said light source;

8 a reflector provided on a back surface of said light guide;

9 and

10 an optical film of light transparent material positioned
11 between said back surface of said liquid crystal display panel
12 and said top surface of said light guide, said optical film
13 including a first surface having an optically rough structure for

14 diffuse-transmitting said light from said light guide and a
15 second surface having a wave structure including a plurality of
16 isosceles triangle prisms arranged side-by-side substantially
17 throughout said second surface, the prisms having smooth surfaces
18 for refracting said light diffuse-transmitted from said first
19 surface to gather light passing through said second surface in a
20 direction toward said display panel.

1 14. The liquid crystal display device according to claim
2 13, wherein a top angle of said isosceles triangle prisms of said
3 optical film is in a range of about 90 degrees to about 120
4 degrees for flat, angle prism surfaces to gather light from the
5 diffuse transmission and directionally distribute said light
6 within a range defined by a given angle.

1 15. The liquid crystal display device according to claim
2 13, wherein luminance of
3 said gathered light is increased within and decreased outside of
4 a desired viewing angle of about 35 degrees in the vertical
5 direction and about 55 degrees in the horizontal direction of
6 said display panel.

1 16. The liquid crystal display device according to claim
2 13, further including a second optical film positioned between
3 said back surface of said liquid crystal display panel and said
4 top surface of said light guide, wherein a direction along which
5 peaks and valleys of said isosceles triangle prisms of one of
6 said two optical films are oriented is at an angle with respect
7 to a direction along which peaks and valleys of said isosceles
8 triangles prisms of another of said two optical films are
9 oriented.

10 17. The liquid crystal display device according to claim
11 16, wherein said angle is perpendicular.

12 18. The liquid crystal display device according to claim
13 16, wherein a polarizer is positioned between said liquid crystal
14 display panel and said two optical films, and a direction along
15 which peaks and valleys of said isosceles triangle prisms of said
16 optical film closer to said polarizer is oriented in parallel to
17 a polarizing axis of said polarizer.

1 (19). The liquid crystal display device according to claim
2 13, wherein the tops of the isosceles triangle prisms are no more
3 than 160 μ m apart.

1 (20) An optical film for use in a liquid crystal display
2 having a front portion and a back portion, said optical film
3 comprising:
4 diffusing means for diffuse-transmitting light illuminated
5 proximal to said back portion of said display; and
6 refracting means including a plurality of isosceles triangle
7 prisms ~~arranged side-by-side for~~ directionally distributing said
8 diffuse-transmitted light toward said front portion of said
9 display and for increasing luminance of light within a viewing
10 angle of about 35 degrees in the vertical direction and about 55
11 degrees in the horizontal direction of said front portion of said
12 display.

1 (21) The optical film according to claim 20, wherein a top
2 angle of said isosceles triangle prisms is in a range of about 90
3 degrees to about 120 degrees.

1 22. The optical film according to claim 20, wherein the
2 tops of the isosceles triangle prisms are no more than 160 μ m
3 apart.

1 23. The optical film according to claim 20, wherein a
2 polarizer is positioned between said front portion of said liquid
3 crystal display and said optical film, wherein a direction along
4 which peaks and valleys of said isosceles triangle prisms are
5 oriented is aligned in parallel to a polarizing axis of said
6 polarizer.

1 24. A film for use in an optical system comprising a light
2 source and a polarizer having a polarization axis, the film
3 comprising a transparent material including a first surface and a
4 second surface, said first surface having a structure including a
5 plurality of isosceles triangular prisms arranged side-by-side
6 for increasing luminance of light passing through said film in a
7 direction corresponding to said polarization axis of said
8 polarizer, and said second surface having an optically rough
9 structure for diffuse transmitting light emitted by said light
10 source.

1 ~~(25.)~~ The optical film according to claim 24, wherein a top
2 angle of said isosceles triangle prisms is in a range of about 90
3 degrees to about 120 degrees.

1 (26.) The optical film according to claim 24, wherein said
2 optical film is positioned within a liquid crystal display, said
3 prisms having smooth surfaces for gathering diffuse transmitted
4 light for increasing illumination within and decreasing
5 illumination outside of a viewing angle of about 35 degrees in
6 the vertical direction and about 55 degrees in the horizontal
7 direction of the liquid crystal display.

1 (27.) The optical film according to claim 24, wherein the
2 tops of the isosceles triangle prisms are no more than 160 μ m
3 apart.

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